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OFFICIAL PROCEEDINGS
Meeting of November, 1923

VOL. XXII.
No. 8.

25c. per copy

INCORPORATED
OCTOBER
1913

Canadian Railway Club

MONTREAL

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CONTENTS:

Report of November Meeting
and
Paper and Discussion
on
"Railway Signalling"

AUG 19 19

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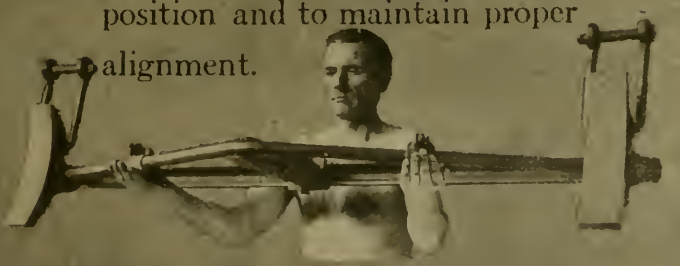

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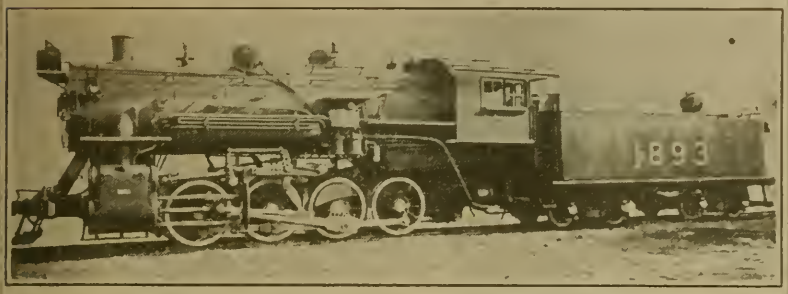

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W. A. BOOTH, Secretary, 53 Rushbrooke Street, Montreal.

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PROCEEDINGS OF THE CANADIAN RAILWAY CLUB

Windsor Hotel, Montreal,
November 13th, 1923.

Chairman (Mr. H. R. Naylor.)

Gentlemen, it is very pleasing to see the large attendance to-night, which includes, I think, many new faces. I also notice that we have with us to-night members whom we have missed from our meetings for some time, I can assure you we are glad to have you with us again. In view of there being another very important public meeting called also in this hotel for this evening, the attendance here leads me to believe that the subjects chosen for our monthly meetings are meeting with your approval, which is very gratifying. I feel to-night with so many members present we shall have a "signal success" as well as a "signal paper," and while our admission fee is not as great as that of the contemporary meeting, I trust it will be equally as interesting.

I wish you would now fill out your attendance cards, and pass them to the centre aisle.

The next item should be the reading of the minutes of the last meeting, but as they have been printed and mailed, we will dispense with the reading of them.

The next item is the reading of the list of new members, which I will call upon our worthy Secretary to do.

Eckerson, H. D. Mgr. Service Dept., Elvin Mech. Stoker Co., New York City.

Lefebvre, J. Clerk, Car Dept., C.N.R., Coteau Jct., Quebec.

Norwood, T. Asst. Foreman, Car Dept. Shops C. N. R. Montreal.

Ring, J. M. A.R.A. Inspector, Canadian National Railways, Montreal.

Robb, W. C. Canuck Supply Co., Ltd., Montreal.

Webber, J. A. Machinist, Can. National Rly., Coteau Station, Quebec.

Chairman:

Will someone please make a motion?

Mr. W. A. Booth:

I move that they be accepted as members.

Mr. J. A. Shaw:

I second that.

MEMBERS PRESENT

Naylor, H. R.
Atkinson, F.
Ayers, J. R.
Barotn A.
Battley, E. R.
Benger, F.
Bergen, F.
Blumenthal, S.
Branston, W.
Broaderup, M.
Brown, H. H.
Buckle, W. E.
Burns, J.
Cameron, H. D.
Chown, T.
Clark, H. A.
Clark, W.
Coleman, J.
Coleman, J. W.
Cooper, F. W.
Crockett, W. B.
Curtis, E. R.
Dyer, W. E. L.
Faughman, B.
Fraser, J.
Ferguson, B. H.
Gardner, K. V.
Gigg, T.
Goldstraw, W.
Graves, W. M.
Hall, G. H.
Holland, N.
Hannaford, R. M.
Hanson, L. J.
Horwood, H. E.
Harrison, J.
Helliwell, W. L.
Hendry, J.
Hughes, J. W.
Inns, L. F.
Inns, G. A.
Jeffries, S.
Jenner, W. C.
Keough, R. E.
Kidd, A. J.
King, S.
Lachapelle, J. D.
Lecavalier, A.
Loudon, E. W.
Logan, G.
Lowe, W. S.
Markle, F. A.
Meissner, O. W.
Miller, W.
Milne, D.
Moore, F. W.
Morin, J. J.
Muir, J. D.
Murphy, J.
McAllister, L. H.
McAllister, W. J.
Norwood, T.
Odell, C. A.
Oliver, H. J.
Palmer, W.
Parker, D. H.
Patterson, W. R.
Payette, F.
Perrett, C. F.
Peverley, R. D.
Pierpoint, G. H.
Piper, H. L.
Piper, R. H.
Pirrie, W.
Playfair, J.
Pope, A.
Prevost, L. E.
Price, H. C.
Prouse, W.
Purdy, F. A.
Richardson, S.
Robb, G. W.
Rogers. W. B.
Ross, J. D.
Serchuck. H. W.
Shaw, J. A.
Shaw, R. O.
Sheridan, W. P.
Sleigh, T.
Smith, L. G.
Spence, W.
Spry, S. H.
Starkey, J. B.

Stewart, A.	Voerge, J. N.	Winship, R. B.
Stewart, T. McA.	Warner, G. E.	Winslow, K. M.
Cwinton, D. B.	Watson, T.	Yost, W. H.
Symmes, H. H.	Watts, L. M.	Young, O. W.
Taylor, E. S.	Waugh, W.	Booth, W. A.
Tilt, E. B.	Whitrod, W.	And others.

Chairman:

Before calling on Mr. Parker to read his paper, I wish to announce that we are privileged to have with us to-night one of our past presidents, Mr. S. King, who, if my understanding is correct, was one of the founders of this Club. It is not often that Mr. King has the opportunity of visiting Montreal and, being with us, therefore, if he will pardon me for having made these remarks, I will ask him to say a few words.

Mr. Sam. King:

Mr. President, and gentlemen, this is certainly an unexpected pleasure to me. I think our President has made a mistake in calling upon me to speak, especially in the discussion of a subject such as signals. However, as he says, I am seldom in Montreal I am pleased to be able to get here to-night so that I can visit with the members of the Canadian Railway Club. I take great interest in reading the monthly proceedings of the Club, and notice with a great deal of pleasure and profit the steady increase in the quality of the papers that are read from month to month. I compare them with what we used to have when the Club was in its childhood, and look upon the ones read in years gone by as being very inferior to the ones we have at the present day, and the one we have to-night will be of benefit to all concerned. We realize the importance of signals, especially so when we are reminded from time to time that fools are made angels at railway crossings. They are divided into two classes—the quick and the dead. We will surely enjoy the paper and illustrations of signals on railroads. I am glad to be with you, and thank you for your hearty greeting.

Chairman:

We are now to have the reading of the paper by Mr. C. W. Parker, Signal Engineer of the Canadian Pacific Railway, Montreal, on "Railway Signalling. This is a subject which might not appear of vital importance, yet the more one becomes acquainted with railway operation, the more one real-

izes how much depends upon the signalling system for its safe operation. I will now ask Mr. Parker to read his paper.

Mr. C. W. Parker:

If any of you have been up here, you will understand what a little stage fright is. If it were not for that I think I could more truthfully say it is a duty combined with pleasure. If I can increase your confidence when you step on a train to take a journey in any way by my paper to-night, I shall consider that I have performed a duty—this is a pleasure.

In writing this paper it was my intention to be suggestive rather than conclusive, so that I could get more discussion out of it and you get more profit by it, so that like St. Paul, you could say: "Part of the show I saw and part of it I was."

"RAILWAY SIGNALLING"

by C. W. PARKER,
Signal Engineer, Canadian Pacific Railway, Montreal.

The term Railway Signalling implies information conveyed to the train runner by means of signs.

The character of the information to be conveyed by the signals, with which I shall deal, is with regard to the path or track on which the train has to travel, and consists generally as follows: "Stop", "Caution" or "Proceed". The appearance of a signal conveying this information is called the aspect, and the information conveyed by the aspect is called the indication.

It is, therefore, of vital importance that there shall be, without the slightest variation, a uniformity of aspect and of indication, so that the engine driver of the train shall be able to determine, without doubt, as quickly as the eye can telegraph to the brain, the manner in which he has to handle his train.

It may occur to some, as we continue with the subject, that signal aspects have undergone, during recent years, some radical changes. It will however be obvious that such change has been towards simplicity rather than complication. For instance, colour of signal blade is now considered unimportant, and much more concern is given to the blade being distinguishable from the general colour of the background. Signal blades are, therefore, generally

painted red with white patch for this purpose, although some railways use yellow.

The position of the signal blade as it extends from its supporting mast, forms the aspect of the signal. At night the signal indications are given by colour of light; red for "stop", yellow for "caution", and green for "proceed".

Some masts support more than one signal blade. One blade above another, such as at diverting track junctions, and various track layouts require different forms of supporting masts. These variations and also special shaped signal blade ends are used; all of these are more easily explained by sketches which I have to show you.

If a line of railway consisted of one single path and only one train operated on that path it would not be necessary to have any kind of signals other than would be needed to start the train at each stopping station. Fixed signals, the term used for a signal at a fixed location, become necessary when switches at junctions and sidings, or more than one train, are introduced.

That a train shall have safe passage over a line of railway, used by one or more other train or trains, blocking by signals is used. One of these methods, in which you will be most interested, is known as Automatic Block Signalling.

The established method of control of all automatic operation is the closed track circuit, the rails being used as conductors of electric current, and this current used to energize the coils of a relay, causes the closing of contact points mounted on the relay armature. The metal wheels and axles of a train conveying this current across from rail to rail of the track, makes a shorter and easier path for the current return and causes the relay coil to lose its power to attract its armature, opening the contact points controlling the signal.

The track circuit current must be confined to sections of the track, this being done by insulating the rail joints at the ends of the section. All the rail joints within the section require bonding to ensure the connection from rail to rail being low in resistance. Several forms of rail bonding are used. The most general is by drilling the rail and with tapered pins plugging in wires, either of galvanized iron or other metal, spanning the rail joints.

The current imposed on the track rails may be either direct or alternating and must be low in voltage because the track rails are to some extent grounded. About two

volts of direct current are sufficient for a section three to four thousand feet long, to operate the track relay, the coils of which are usually of 4 ohms resistance, and the relay adjusted to pick up its armature at not less than 90 milliamperes and drop away at a reduction of about half the pick up.

Relays are sealed to prevent tampering with the adjustment.

When a train has entered a block section under the protection of the signal, it must continue its influence to hold the signal in the stop position until it has reached the protection of the next signal in advance. The track circuit must therefore be continuous from signal to signal. This distance being usually longer than one relay can care for, requires that the current must reach the rails through the contact points of the relay of the adjacent section.

In general the current enters the track at the end of the section where the train in its movement last leaves it, in other words, the train movement is from relay to battery.

If direct current is used for the track circuit, it may be generated from primary cells or from current in storage cells. The latter are sometimes charged from an alternating current line by rectifiers.

Signals are operated by motor driven mechanisms, either alternating or direct current. Motors using direct current are usually 10 volts, current from primary or storage cells being used.

Primary cells are of zinc and carbon plates with caustic soda active element, and with us require housing protection from frost in winter, which serves also to prevent evaporation in summer. Each cell gives 6/10 volt and has 500 ampere hour capacity.

Automatic signals are arranged to go to stop by gravity. Some are what is known as normal stop, that is when a train is not approaching it although the block it protects is clear, the signal is at stop. When a train approaches the signal clears to either caution or proceed if, respectively, one or two blocks in advance are clear.

Some signals are normally at clear and go to stop only when a train is in the block protected.

On two or more tracks on which traffic direction is established, blocking for following protection only is necessary.

On single track, signals must provide both following and opposing protection.

Two methods are general; one known as the overlap and one as the absolute permissive system, sometimes called Traffic direction system.

In the overlap system the control of a signal is extended beyond the next opposing signal. Opposing signals are also counter-controlled so that only one of the two protecting a block at either end can be clear at one time.

With the absolute permissive system all signals are normally at clear. The leaving signal at each passing track is "absolute", and must not be passed by a train when in the stop position. When clear and passed by a train it assumes the stop position as also do all signals in the opposing direction to the next passing track. Trains in the same direction may follow as by signals on double track.

Automatic signals are controlled by the position of all switches in or leading to the main track and by cars standing foul.

The operation of switches and signals by levers so interconnected that the levers cannot be moved except in a predetermined order, is the substance of the definition of interlocking.

Interlocking may be entirely mechanical in its operation, or it may be operated by power or a combination of the two. With power, however, the operation of the function, whether switch or signal, is controlled by the lever, the locking between the levers, with but few exceptions, is done mechanically.

The locking in a large machine is very complicated as it is necessary to provide for the freedom of all routes that do not conflict and prevent the operation of setting conflicting routes or signals. This requires a great deal of study.

Power interlocking may be by electric motor operation or by compressed air cylinders controlled electrically.

The greater number of interlocking plants we have in Canada are at railways crossing at grade. The general practice in this country is to protect crossing by signals and derails. The derails being so interlocked that while they may all be in the derailing position, the closing of any on one line locks all on the opposing line derails open. The signals also cannot be cleared until the line over which they govern is properly set up.

At interlocked switches and derails it is necessary to provide means to prevent them being operated while the train is passing over them. Mechanical means in the form of detector bars are used for this purpose. These are placed on the outside and close to the rail head, and in their travel rise above the top of rail and the presence of wheels on rail interfering with this travel, prevent the operation of the points. Electric lever locks operated from track circuit are used instead of detector bars with the advantage that the lock control can be extended to the fouling points at a switch and over a length of track section through the entire plant if necessary, locks being effective during the occupation of the track by a train up to any point and released as soon as the train wholly clears it.

Such refinements as annunciators, approach and route locking, track indicators, illuminated diagrams give the interlocking operator information and protection which enables him to handle the plant work with safety and expedition.

The prime essential of an interlocking plant is safety with expedition. It is, however, advisable that the operator shall at all times have the ability to at once restore a signal to the stop position after having cleared it, but provision is made by means of time releases to prevent any disturbing of the track functions until a period of time has elapsed after the signal has been restored to stop.

These releases are of various types. Some mechanically operated by a lever action, releasing the mechanical locking; some merely closing an electric contact for picking up a stick relay for the release of an electric lock, by means of a hand operated screw, or clock work, or mercury tube requiring no hand operation.

Protection at public highway crossings does not strictly come under the head of Railway Signalling. It is, however, part of the duties of the signal staff.

Next in order of advance from the ordinary crossing sign is the crossing bell, which is automatically controlled almost invariably by closed track circuit. The operation of the bell, and sometimes also light, is by normally open circuit. Next in order is the automatic flagman or wigwag signal which has a swinging red banner and light and also a bell controlled by closed track circuit. Next by crossing gates. These are at most a moral barrier as are the previously mentioned forms. Gates have, however, the ad-

vantage of having an attendant who, like our City Police Force, receives more respect than the silent policeman at our street intersections, and, if I may be allowed to express my own opinion, I find no logical reason why travellers on a public highway should trust their lives to any man or device for such protection as they themselves can provide.

Chairman:

Gentlemen, the paper is open for discussion.

Mr. John Murphy:

Mr. President and gentlemen, I was very much pleased with Mr. Parker's paper on "Railway Signalling." It is very important work. Very few of us know anything about the details of this wonderful branch of railway work. One picture thrown on the screen to-night, from California, where they have colored electric light signals instead of semaphores on high speed interurban electric railways, reminds me of my trip in 1915 to Southern California. I happened to be on one of these electric cars, sitting in front with the Superintendent and his small son. We were travelling about 50 miles an hour. The little fellow was reading the signals: "Clear," "Clear," "Clear." Then a red one came into view, and kept showing red until we were quite close to it. The little boy asked his father what was the matter, and just as he spoke the red light went out—which showed that the car ahead, which we could not see, had just gone out of the block, and we were free to proceed at high speed—because the red light was replaced by a green one.

There are many sharp curves and steep grades on those Electric Railways and, as the interurban cars are very heavy, they could not dare to run as fast as they do if the lines were not equipped with reliable automatic block signals.

I often think that the simple electric light signals will one day entirely replace the moving arms with their complicated operating mechanisms. The lights guide the engine-men at night—why not in the day-time also?

I was wondering when Mr. Parker was talking to-night if there were not some locomotive engineers here—the men who are primarily concerned with the operation of signals. They could make some intersting and instructive comments on Railway Signals as they know them. The fact that there are only a couple of volts controlling the wonderful mechanism of automatic block signals is hardly creditable, and no doubt there are others here like myself who have been brought up in the

electric power business, who can scarcely believe it. Lighting circuits such as the one in this hotel may jump up or down 10 volts above or below the normal voltage and, beyond getting more or less light, no one is inconvenienced. But the Signal Engineer has practically nothing at all to start off with, to say nothing of the little mite he has to "come and go" on! I thank you for the privilege of meeting the members in this manner.

Chairman:

I think we have with us Mr. Spence. Will he let us have a few words?

Mr. W. Spence:

I see that all the members are at the back and, as Mr. Parker stated, this is certainly not a women's meeting. I have listened with a great amount of interest to the paper by Mr. Parker and I cannot say anything about the construction part but only in respect to the operating part. The word electric light signal—we are using it on the road I am employed with at the present time. It is the best I have experienced. No matter what kind of weather you are running in, you can locate it at any distance. You know what you have to contend with, green, red or yellow, and if it is a red signal you get a yellow caution signal first, which tells you there is a red one ahead. With the trains that we are running to-day, and the colored-light electric signals, there is never any doubt as to what you are going to find behind the signal, and, while we are on the subject of automatic signals, it puts me in mind of a paper that was read at this club at the last meeting under the heading of "Safety First." Imagine running sixty miles per hour and finding someone trying to get ahead of you so that they can cross some grade crossing! If the automobilist had some kind of signal at these public crossings it would be a boon to mankind. In the working timetable governing the operation of trains there is an item which states no train must pass another standing at a station that is discharging and receiving passengers who require to cross another track which handles traffic in an opposite direction. You have seen a man run behind a train and pass immediately in front of a train running in the opposite direction, and there has been a good many hairs stand on end, especially the engineer's and fireman's. When coming into Montreal recently, nearing Lachine, running at about 10 miles per hour, prepared to stop, a passenger got off a train, stepped out into the middle of the

next track and proceeded to light a cigarette. Then, if you hit him, you would be asked "Was the bell ringing? Did you sound the whistle? etc." Mr. Parker has gone into details on his subject, and I wish to say that it is one of the most important we have to contend with.

Mr. E. Keough:

I have not very much to say on this subject. I certainly have heard quite a lot on signals, and have enjoyed the paper to-night. I noticed one thing on the sketch Mr. Parker showed to-night—the insulated joints. They are quite a source of trouble to trackmen, and they are about the only part of the track that signalmen come in contact with. There is certainly a lot of room for improvement in respect to these joints. I have wondered why Mr. Parker has not come out with a new joint, as most signal engineers have one or more patents on these joints. However, we all know that signals are a wonderful thing on the railroad, and as our signal engineer friend has said we will go on seeing improvements in the future such as we have experienced in the past. I have enjoyed the paper a great deal, and thank you for the chance of speaking.

Mr. N. Holland:

When Mr. Parker started to talk about dolls, I saw a lot of these young fellows around me prick up their ears and take notice, but when he said dummy dolls ——!! If we do not know a lot more about signals after the paper, sketches and pictures which have been presented to us to-night, there surely is something wrong. We have listened to a very splendid paper. However, I am reminded of a Signal Engineer working for a Southern Railroad who was putting in a track in a locality where there were a lot of rattlesnakes.

The engineer had warned the Dago foreman to look out for rattlesnakes, and had told him that one could easily tell when a snake was going to strike as he always shook his rattles first. Walking along the track one day the engineer was horrified to see the foreman standing in the middle of the track, while about three feet away from him was a big rattler just in the act of striking.

With one jump he managed to grasp the Italian by the collar of his coat and pull him back just as the snake sprang past the spot where he had been. Being much upset, he naturally began to abuse the Dago, and asked him why he had not got out of the snake's way when he saw it. The foreman's

reply was: "Excoos, Boss, Excoos! How I knowa to jump, when da bigga snake no ringa da bell!"

Chairman:

I have no wish to curtail the discussion at all. Are there any others who wish to ask further questions on the subject?

A Member:

I would ask Mr. Parker what they do in case of electricity trouble, and the light is out?

Mr. C. W. Parker:

I presume you mean, if it were a light signal. I do not know how an engineer could tell just the spot of darkness where he should stop. There is no provision made in connection with the light signal to mark the location of it. At this point I might tell you the difference between the light signal I showed on the screen and the light signal we have used so far.

It is not always possible along the entire road where you propose to install a signal to obtain current supply to enable you to use a type of light signal. You require at least 110 volts if you have to carry it any distance, to get sufficient intensity of light with a colored light signal, as shown on the screen. The type we have installed recently is lit at about six volts from primary cells, and has sufficient power of light to be seen 3000 feet away. I am sorry I cannot give that gentleman an indication when a light signal is out. There is another matter that occurs to me in this connection. We do not use any kind of Automatic Signal without a marker light on it. The marker light is distinct from the signal light and marks the location. The rules state that the absence of an indication where it should be given is a "stop" indication. This is the only way we have for providing for a light being out.

Mr. J. W. Hughes:

I was wondering if it would not be interesting to know just what system is used to keep trainmen posted in regard to general operating rules, also, in regard to changes that occur from time to time in Signal Rules. To a layman, it would certainly appear that Signal instructions are more or less complicated.

Mr. C. W. Parker:

The method of advising the operating men of automatic signals (and I am speaking of methods employed by the C.P.R.), is that the Enginemen's and Trainmen's working timetable has two or more pages of instructions, and there are no peculiar features about the signals that are not given in the timetable.

Chairman:

Gentlemen, the evening is now getting rather late and, while I feel that there are others who might wish to put further questions, if they will submit them in writing to Mr. Booth, they will be included with the minutes of the meeting.

Mr. Parker, I am sure we have had much pleasure in listening to your excellent paper. I wish to thank you on behalf of the Club for your kindness in coming here and the giving of your time in the preparation of the subject for us, I assure you we appreciate it very much.

The paper for the December meeting will be read by Mr. R. L. Laprairie (Inspector, Railway Mail Service, Montreal), on "Handling of Mail by Railways." I understand we are to have screen illustrations with this subject.

Gentlemen, I wish to remind you that your Executive Committee are not overlooking the Annual Banquet. A special committee has been appointed, as is customary, to decide on the various details and make the necessary arrangements, of which you will be advised later.

There is no further business, except that I remind you of our next meeting, when I hope we shall have you all with us that evening. The usual refreshments have been provided to the left as you leave this room.

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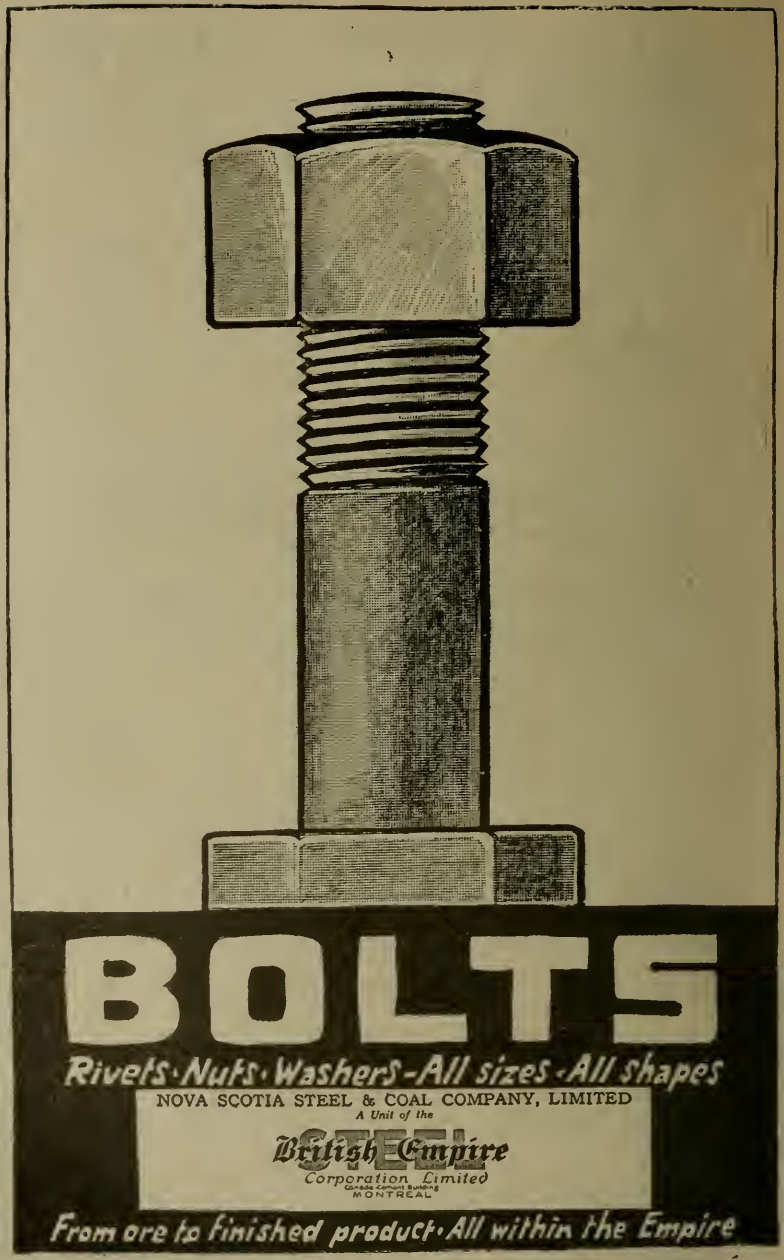
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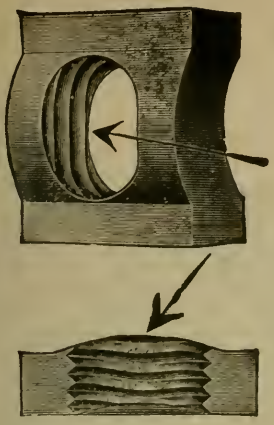

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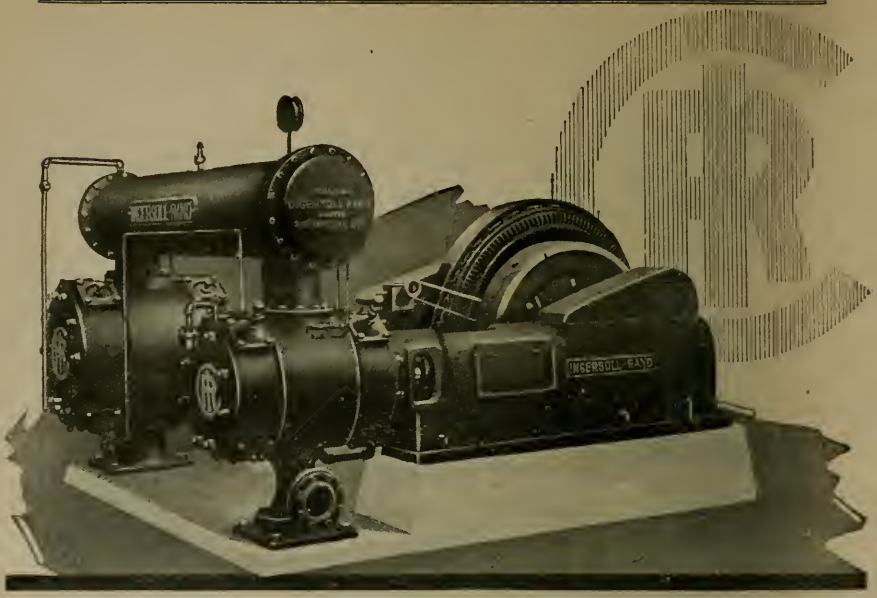

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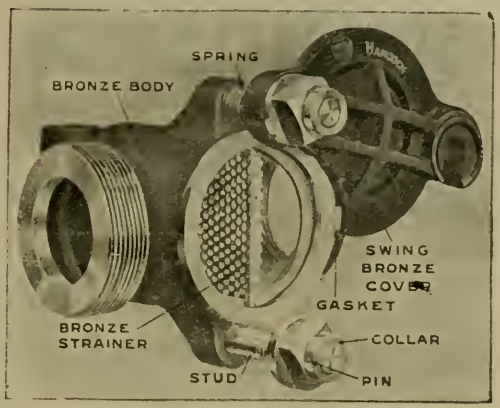

Fig. 3551

The Locomotive Hose Strainer shown in the cut consists essentially of a perforated plate of ample area, mounted in grooves in the body. The opening through which the screen is introduced is closed by a cover, making a water tight fit.

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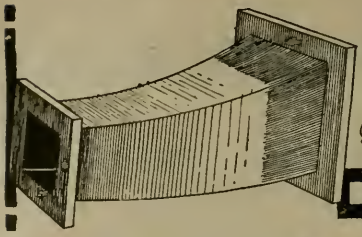

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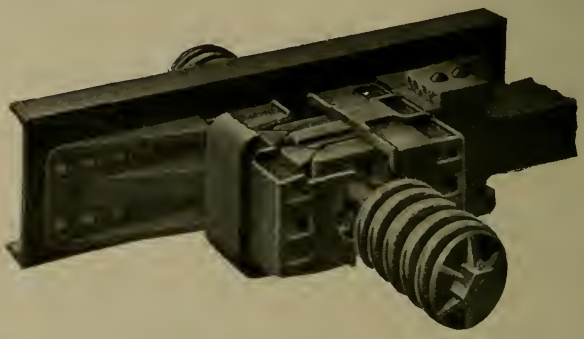

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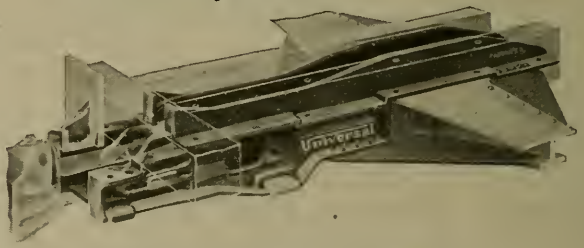

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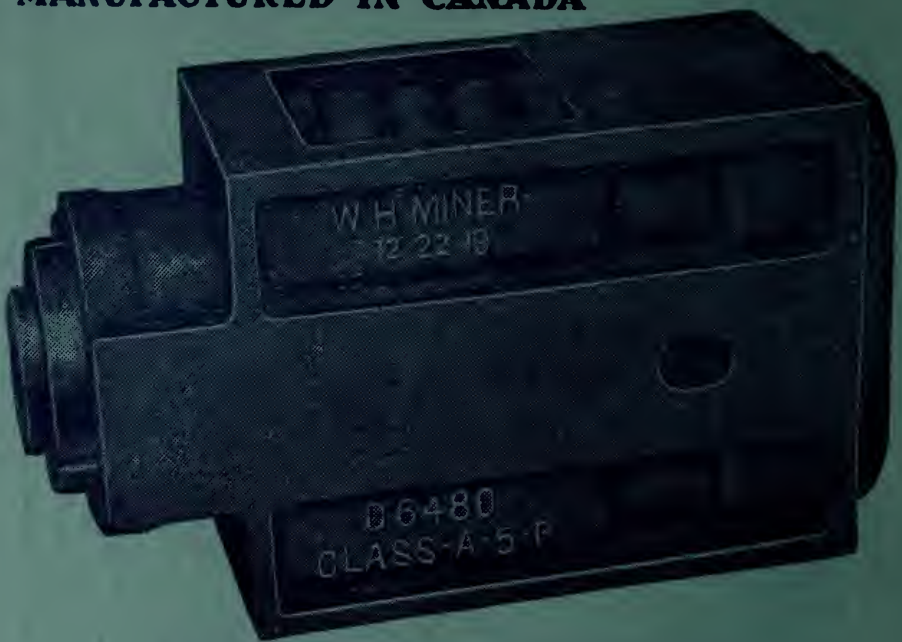

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